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AN ASSESSMENT OF THE UTILISATION OF COMPUTERS AS TEACHING AND LEARNING RESOURCES: A CASE STUDY OF SELECTED GWERU URBAN SCHOOLS

Lockias Chitanana

Department of Educational Technology, Midlands State University

ABSTRACT

Computers have a great potential to transform the teaching and learning process in our classrooms. However, the realisation of this potential depends on how much our teachers use this technology in their teaching. It is, therefore, important for us to know how teachers are making use of computers, so that we can determine where additional support is needed. As such, the primary aim of this study is to assess how teachers in Gweru urban schools are utilising computers in their classroom teaching. The data collected through a questionnaire administered to 50 teachers indicate that computers have not been fully integrated into the teaching and learning process in the schools. Despite the fact that computers have been in schools for the past decade, there is evidence that the majority of the teachers is not well prepared to make use of computers as teaching and learning resources. Only a few teachers indicated that they are using computers in their teaching. Further investigation on how these teachers were using computers in their teaching revealed that the teachers were only using computers to reinforce the traditional teacher centred methods of teaching. It is clearly demonstrated by the findings of this research that the utilisation of computers as teaching and learning resources cannot be left to trial and error. In this regard, the research findings point to the need for both pre-service and in-service teacher training in computer skills as well as pedagogical skills which are prerequisites to the effective utilisation of computers as teaching and learning resources.

Background to the study

In the new millennium we can no longer speculate as to whether computer technology has a place in our education. It has become clear that computers provide an unprecedented opportunity to make education an agent of social change and development. In Zimbabwe, like in any other country in the world, computers have become a strategic resource in the globally networked economy and the country's position has been clearly demonstrated by His

Excellency, President Robert Mugabe's active leadership in supporting children's access to computers through computer donations to ten schools in each of the ten provinces in the country, two of these being in rural areas. According to the e-Readiness Survey Report (2005), the Ministry of Education alone has supplied over 1500 refurbished computers to 122 schools around the country. In addition, there have been a number of computer projects such as the World Links for Development (WorLD) programme and the Better Schools Programme Zimbabwe (BSPZ), aimed at increasing the use of computers in the country's primary and secondary schools. The World Links for Development alone has established 42 school-based tele-centres, each with a minimum of 11-networked computers with Internet access (WorLD Country Report 2003).

The Ministry of Education Sport and Culture is encouraging all schools to equip themselves with appropriate levels of technology according to the means and capacities of the schools. Schools are encouraged on their own initiatives to seek assistance from various stakeholders, parents, community and private sector organizations as the Ministry can only provide technology to schools in stages. In response to this call, many schools have made a considerable financial investment in the purchase and installation of computer equipment for classroom use. At some schools in the area under study, the parents, through their School Development Associations (SDAs), have raised funds to acquire computer technologies for their schools.

Statement of the problem

Although the number of computers in the schools continues to increase, sadly, the overall change in teaching and learning has been minimal. There is evidence from research and benchmark data that ICT applications are not providing teachers and students, in many schools, with the educational benefits that are expected. For example Breen *et al.* (2001) and Marriott *et al.* (2004) have shown that few teachers facilitate student's use of computers. This study sought to find out how teachers in Gweru Urban schools are using computers available in their schools to enhance the teaching and learning process. Put precisely, the problem of this research is to assess the extent to which teachers in Gweru urban schools are using computers as teaching and learning resources.

Research questions

This study was designed to answer one broad question: How are teachers in Gweru urban schools making use of computers in their classrooms in view of the need to integrate computers as teaching and learning resources across the curriculum?

More specifically, the data collection was intended to provide **evidence to answer the following research questions:**

1. What is the level of teacher preparedness to use computers as teaching and learning resources?
2. What types and levels of computer technologies are being used by teachers in their teaching?
3. What are the innovative pedagogical practices in which teachers use ICT?
4. How are teachers taking advantage of affordances offered by ICT to enhance their pedagogical strategies?

Significance of the study

To date, there has not been any systematic effort to determine the level of computer use in Zimbabwe schools. Until now, research on technology in Zimbabwean schools has been primarily in the form of numbers, that is, statistics on the number of computers in the schools, the number of pupils per computer, and the number of schools with access to the Internet (e-Readiness Survey Report 2005). The statistics are helpful, but they do not paint a complete picture of what is happening as regards computers in the schools. There has not been any systematic effort to date to determine the level of computer use in Zimbabwean schools. Little is known about how teachers use computer technology in teaching and learning, how much support they receive from their institutions and the challenges they encounter in the use of computers. It is, thus, appropriate and important that this study was conducted within a broad curriculum framework to determine how teachers were making use of computer technology to enhance teaching and learning. Amenta-Shin (2000) suggests that current research should consider teachers' technology practices.

Since there has been limited research on computers in education in Zimbabwe, one of this study's major contributions will be to fill this knowledge gap by unearthing a wealth of new information on how computers are being used in schools. Such information is pertinent to policy-makers and curriculum developers as they plan for the effective utilisation of computers in schools. The findings of this study will also help teachers in their professional growth. Lastly, teachers can use the results of this study to develop the best and most effective approaches to the use of computers as teaching and learning resources across the curriculum. The results of the study will also be important in making decisions on providing teachers the needed computer resources and support.

Brief Literature Review

As Pelgrum and Law (2003) have observed, the issue of computers in education started to become popular in educational policy-making in the early 1980s, when relatively cheap microcomputers became available for the consumer market. Pelgrum and Law (2003) also note that with regard to the early introduction of microcomputers in education in the 1980s, there were high expectations that it would make education more effective and motivating. When the potential use of computers in schools was first mooted, the predominant conception was that students would be taught by computers (Mevarech and Light 1992). In a sense it was considered that the computer would take over the teacher's job in much the same way as a robot computer may take over the welder's job. Development and use of computer tutorials software was promoted (Chambers and Sprecher, 1984). With the passage of time a range of other educational software was developed that was not based on the premise of teacher replacement, for example, simulation software, modelling, and tools software. However, according to Downes, Perry and Sherwood (1995), the major argument used to support the introduction of greater amounts of computer hardware into schools was the perceived need to increase the level of computer literacy of students. Towards the end of the 1980s and into the 1990s while the computer literacy rationale still remained (Hannafin and Savenye, 1993 and Hussein, 1996), the major rationale for having computers in schools was more concerned with the need to use computers to improve student learning.

Considerable resources have been invested to justify the place of technology in education, and many research studies have revealed the benefits and gains that can be achieved by students, teachers and administrators (Jhurree, 2005). Hepp, Hinostroza, Laval and Rehbein (2004) state that the following are reasons for the application of computers in education:

- *A new society requires new skills:* Due to the fact that computers are the pre-eminent tools for information processing, new generations need to become competent in their use, should acquire the necessary skills, and, therefore, must have access to computers and networks during their school life.
- *Productivity enhancement:* Schools are knowledge-handling institutions. Therefore, computers should be fundamental management tools on all levels of any educational system, from the classroom to the ministry.
- *A quest for quality learning:* Schools should profoundly revise present teaching practices and resources to create more effective learning environments and improve life-long learning skills and habits in their students.

Moreover, Papert (1997) identified the following positive effects of computers on students' learning:

- enhanced motivation and creativity when confronted by the new learning environment;
- a greater disposition to research and problem- solving focused on real social situations and more comprehensive assimilation of knowledge in the interdisciplinary computer environment;
- systematic encouragement of collaborative work between individuals and groups;
- ability to generate knowledge;
- capacity to cope with rapidly changing, complex, and uncertain environments;
- new skills and abilities fostered through technological literacy.

Furthermore, Kozma and Anderson (2002) argue that computers are transforming schools and classrooms by bringing in new curricula based on real world problems, providing scaffolds and tools to enhance learning, giving students and teachers more opportunities for feedback and reflection, and building local and global communities that include students, teachers, experts and other interested parties.

In order to address the question "How can ICT (computers) be used to support education change?" Kozma (2005) suggests the following types of approaches:

- Computers are used to improve the delivery of and access to education. This approach can improve education on the margin by increasing the effectiveness by which instruction is distributed, but it need not involve fundamental change.
- Computers can be used to improve student understanding and increase the quality of education.
- Computers can be used for knowledge creation and knowledge sharing which can contribute to the transformation of the education system.

Similarly, Hepp, Hinostroz, Laval and Rehbein (2004) state that the roles computers play in the educational system can be pedagogical, cultural, social, professional and administrative as follows:

- **Pedagogical tool role:** computers provide a new framework that fosters a revision and improvement of the teaching and learning practices such as collaborative, project-based and self-paced learning.
- **Cultural, social and professional roles:** the cultural, social and professional roles of computers are exercised primarily through an

effective use of the vast amount of information source and services available today via the internet and CD-based content for the entire educational community: students, teacher, administrators and parents.

- **Administrative roles:** computers have important roles to play in making school administration less burdensome and more effectively integrated to the official information flow about students, curricula, teachers, budgets and activities through the educational system information pipelines.

However, it is important to note that since the beginning of the 1990s, educators have been particularly concerned that very little of these potential of computers to support learning in schools seem to have been realised, despite a sufficiently installed base of computers. The greatest challenge is to harness the advantages of the technology, in order to improve the delivery and quality of educational services (Wagner & Kozma, 2003).

Methodology

The researcher felt that an interpretive study was required, in order to search for meaning of the issues relating to the use of computers in schools. As such, the research adopted an interpretive paradigm based on a case study design. A case study methodology was employed to explore the respondents at their natural setting. (Rose, 1991).

The Schools

The case was selected from thirty-six (36) primary and sixteen (16) secondary schools in Gweru Urban. Out of these schools fifteen (15) primary schools and eight (8) secondary schools had at least five computers. Since the researcher's interest was to assess computer technology use and understand how teachers were using it in their teaching, it was only those schools that had made significant investment in computer technology that were considered. The researcher finally selected a sample of four (4) primary schools and two (2) secondary schools from a diverse range of backgrounds and differing levels of computer use. Of the two secondary schools, one is located in the high-density suburbs of the City of Gweru and the other one is a government boarding school. Two primary schools are situated in the city centre and they are former group A schools (or former whites-only). One of the schools situated out of the city, is located in the low-density suburbs and the other is located in the high-density suburbs.

Respondents

A prerequisite for the participation in the project was that all teachers should have had previous experience and be currently involved in the use of computers in the teaching-learning process. There were 50 who satisfied these conditions. All of them were trained teachers and had at least 5 years of teaching experience.

Data Collection Instruments

Studies in each of the schools involved collecting data by means of questionnaires, interviews, observations and collecting relevant documents (such as ICT policies and school development plans) for analysis. Classroom observations were carried out first, followed by distribution of questionnaires and in-depth interviews with selected teachers. Yin (1989) explained that the observation was an opportunity for the researcher to gather evidence for a case study. Since the study was to look at how teachers were using technology, observation was crucial for further understanding of issues that emerged during the implementation. In addition, classroom observation triangulated the findings with the findings from the interviews and documents (Merriam, 1998).

Document reviews were carried out during the fieldwork at the time when no observations or interviews were being carried out. In this study, pertinent documents such as policy documents, syllabuses, schemes of work, timetables, and inventory lists were used to collect relevant data. These are official documents in which teachers write down their daily teaching plans. In the schemes of work, the learning objectives, learning activities and teaching aids are written to guide teachers to achieve the learning objectives of the day.

Data Analysis

The data gathered were analysed qualitatively and quantitatively to provide answers to the research questions. The data generated by interviews, classroom observations and document reviews were transcribed, coded and categorised relating to common conditions arising from the data. The results are presented and discussed in the following sections.

Results

The data collected led to several major findings. These findings give us better understanding of how computers are being implemented in the

schools. These findings are presented and discussed below.
Teachers' personal information

The first segment dealt with teacher demographics which were limited to age, sex and educational qualifications and training (see Table 1).

Table 1: Personal Information

AGE GROUP	NUMBER	QUALIFICATION		COMPUTER SKILLS TRAINING	
		CE/DipEd	BED/MED	Yes	No
26-30	12	12	0	10	2
31-40	20	14	6	8	12
41-50	8	4	4	6	2
51-55	6	5	1	3	3
56+	4	4	0	2	2

Given the fact that the teaching staff in urban schools is predominantly female, it came as no surprise that out of the 50 participants, 36 (72 %) were female. While it would have been interesting to look at the gender perspective in the responses, it could be discounted without affecting the outcome. So the numbers shown in the tables include both males and females, but if a significant conclusion based on gender was worth drawing attention to, it would be mentioned. It is obvious that the majority of the respondents are in the 26-30 and 31-40 age groups (12 and 20 i.e. 64 %), which means that their role may be highly significant for two reasons:

1. They would be in the teaching profession for a greater period of time than the older teachers or administrators and
2. Their numbers could affect the impact they and their attitudes have on the students.

Only half (50 %) of those in the 30-40 group own a computer, while (60.8 %) of the 40-50 age group have one. This contrasts rather unfavourably with the figures for the older age groups. However, it will be rather unjust to say that not owning a computer is likely to make the person 'anti-computer', without any further support. It is also worth noting that the majority of teachers even without computers obviously have access to a computer, most likely in the school, and they claim knowledge of word processing. But word processing alone is clearly not enough, for computer literacy has to encompass the other uses like surfing the Internet, using e-mail for communication purposes and so on.

Computer Resources in Schools

Computer Hardware and Software Available

Three of the schools had fully-equipped computer labs with as many as 20 computers while two others were in the process of acquiring more computers or setting up their own computer lab. Two schools had benefited from the President's donation of computers and these computers were in a good working condition.

Internet

Internet access is available at three schools. Access to recommended educational websites is encouraged. There is little opportunity for misuse of the Internet facilities because of the close monitoring by the responsible teachers. However, Internet connections impose additional expenses which all the three schools find hard to meet.

Computer Teachers and teaching arrangements

The computer resource teacher in each of the schools is obviously trained and is generally responsible for the type of programmes run as well as the maintenance of the computer facilities. Some have set up computer clubs with sessions after school hours or on Saturday. At most schools, the teaching of computer skills is conducted by computer teachers, usually one for the morning session and one for the afternoon session. At four of the six schools, the general teaching staff is not involved in actually conducting the classes even if the activity focus relates to their subject. Where there are formal classes (as in three of the schools), they are conducted once a week and last one hour. Since there is no provision within the weekly timetables, these computer classes are held during the officially designated co-curricular activities such as clubs and sports after school. There is a danger that making computer learning a co-curricular activity may be misconstrued as a less important activity. Clearly the non-inclusion of computer classes within the official timetable appears to be not in line with the Government policy of incorporating computers as an educational tool.

The educational materials generally used in the computer classes are readily available CD-ROMs, with a few teachers using some materials downloaded from the Internet. Students also learn the basics about computers, such as mouse, CPU etc. Word Processing skills, Spreadsheet skills, even the use of PowerPoint (Microsoft Applications) is taught.

Level of teacher preparedness

The results of the study show that teachers were not fully prepared to make effective use of computers as teaching and learning resources. As shown in Table 2, only 18% of the teachers indicated that they could perform advanced tasks on a computer. The majority of the teachers were still struggling with their computer basics. Fifty-four percent (54%) of the teachers indicated that they could only perform basic functions on the computer and 28% indicated that they could not operate a computer independently.

Although in some schools training is provided, it results in personal, individual gain only (though not necessarily bad in itself). The general teaching staff is not directly involved in the computer classes. However, in most cases, teachers usually pick up skills themselves (see data from questionnaires).

Table 2: Teachers' perceived levels of expertise in using computers (N=50)

		Percentage
Novice (Cannot operate a computer independently).	14	28%
Intermediate (Can operate computers independently and perform basic functions only).	27	54%
Advanced (can perform multiple tasks including file management)	9	18%

In terms of pedagogical readiness, the results of the study indicate that teachers lack necessary professional training to effectively use computers as teaching and learning resources. As shown in Table 3, only 28% of the teachers indicated that they had received training in the use of computers as teaching and learning resources during their teacher training. It is not surprising, therefore, to note that only 30% of the teachers felt that they were well prepared to use computers in their teaching. The majority of the teachers either doubted their preparedness (44%) or felt that they were not prepared (26%) to use computers in their teaching (see Table 4).

Table 3: Teachers who received pedagogical training in the use of computer during their teacher training course (N=50)

	Number	Percentage
Yes	14	28%
No	36	72%

Table 4: Teacher's perceived levels of preparedness to use computers in their teaching (N= 50)

	Number	Percentage
Not prepared	13	26%
Somewhat prepared	22	44%
Very prepared	15	30%

Interviews with the teachers confirmed the teachers' lack of preparedness and confidence with the use of computers in their classroom practice. While many teachers were happy with the efforts made for hardware acquisition, they expressed the need for more applicable software for their respective subject areas. They expressed serious frustration with the lack of quality in-service and technical support. They pointed to the problem that in-service training followed the typical model of "too much tell about it with not enough hands-on training." In one school (World Links Tele-centre) however, where the approach has been to train the teacher to teach peers in the school, most teachers stated positive thoughts about the technical support and in-service training provided.

Utilisation of computer resources by teachers

The utilisation of computers by teachers was investigated under three categories of use, namely personal, instructional and administrative. Regarding software that the teachers use in school, there are four programmes available, which are Microsoft Word, Excel, PowerPoint, and Access. Generally, the results of the study reveal that very few teachers are using computers for teaching and learning purposes. All the teachers knew how to use at least one piece of software, in particular Microsoft Word for personal use. Interviews showed that teachers would use this software to type their curriculum vitae (CVs), application letters, wedding cards and programmes. They would use e-mail to send messages to and receive messages from their friends and relatives in the Diaspora. The teachers reported that they were using the World Wide Web to search for jobs, download music and visit sites that sell cars for example www.japancars.com. There was a prevalent use of Microsoft Word (68%), e-mail (61%) and the World Wide Web (50%), for personal business (see Table 5). There were few teachers who indicated that they were using the different productivity software for teaching and learning as well as administrative purposes. Only 21 % of the teachers indicated that they used the word processor for both pedagogical purposes and administrative purposes. Only 18% of the teachers used the spreadsheet for administrative purposes. It

was disheartening to note that only 18% of the teachers indicated that they used subject specific software for classroom teaching.

Table 5: Teachers who were using application software for personal, Instructional, and administrative purposes (N= 50)

Computer Software	Number of teachers		
	Pedagogical Use	Personal Use	Administrative Use
Word processor	21%	68%	25%
Spreadsheet	14%	25%	18%
Access	18%	25%	0%
PowerPoint	4%	14%	14%
Internet and World Wide Web	7%	50%	4%
Email	4%	61%	4%
CD-ROM information Sources	7%	25%	0%
Online information sources	4%	14%	0%

Interviews revealed that few teachers were using Microsoft Word and Excel to do their work as teachers. One main reason why they were able to use this software was because school heads at 3 of the schools had insisted that all test and examination question analysis for the monthly tests, and analysis of national examination results must be done using the computer (see Table 6).

Teachers who indicated that they used computers for instructional purposes of computers, were asked to find out the extent to which the types of teaching methods enhanced active learning among students. The follow up showed that the types of activities that teachers engaged their students in, did not take advantage of the strengths of the computer as a teaching and learning tool. Only 35% of the teachers indicated that they used computers to present individual and group instruction. A few teachers also took advantage of the computer as a tool for managing and organising their teaching. Only 11% of teachers used computers to plan and design instruction that incorporates technology, 32% used computers to prepare handouts for students and 21% used computers to access information on their subject content. Only 29% of the teachers indicated that they used computers to manage students' records and calculate students' grades. None of the teachers indicated that they used the Internet to extend interaction beyond the classroom by allowing communication between the teacher and students using Internet tools. The results are presented in Table 6.

Table 6: Types of Activities in which teachers used computers in their teaching (N = 50)

Instructional Activity	Number	Percentage
To present individual/group instruction	10	35%
To plan and design instructional that incorporate technology use	16	21%
To record and calculate student grades	8	29%
To access information on instructional resources	7	25%
To make handouts for students	9	32%
To plan and design teaching and learning materials	3	11%
To post student work and lesson notes on the World Wide Web	0	0%

However, it was encouraging to note that many teachers expressed the desire to integrate computer technologies more if someone would show them what is available, appropriate, and how to use it. Nevertheless, a few teachers expressed concerns about traditional learning skills such as spelling and handwriting that they thought may be weakened by the use of computers.

Discussion of findings

The use of computers as teaching and learning tools in schools demands a paradigm shift in the way we teach. The new learning environment differs from the one we are familiar with and the teacher has to cope with many more uncertainties. It has been argued that unless teachers are able to change their teaching practices and become capable of adapting to new technologies, continued expenditure on computers will have little impact on student learning and classroom practice (Ward, 2003). The findings of this study indicate that the real innovative use of computers as teaching and learning resources has not been broadly adopted and their use has not yet had the positive impact that its advocates expect. It was evident from the research findings that teachers had not gained much ground in the use of computers as teaching and learning resources. Using computers in an innovative manner so as to improve the quality of teaching and learning is an important bottleneck teachers have to contend with. Most of the uses observed in this study showed that teachers were using computers for their own private business. However, it should be pointed out that teachers' use of computers for their own needs is relevant from a motivational viewpoint and that it may also aid in the development of a generalisable conceptual framework explaining educationally related computer uses by teachers.

It can be interpreted from the findings that in addition to the general computer literacy skills, pedagogical skills form the core of the effective use of computers as teaching and learning resources. Reasoned from the findings, it is conceivable that teachers require more than computer literacy skills for them to effectively use computers as teaching and learning resources. The results of the study indicate that, although some teachers indicated that they had a reasonable level of confidence in using computers, a majority of the teachers mentioned that they are hardly prepared for new didactical teaching methods that make use of computers. It is clearly demonstrated by the results that teachers have not taken the advantages of computer technology to create powerful learning environments and guide students in their learning processes individually and therefore, computers are being under-utilised. If the computer is being used, then this is mainly for the purpose of word processing and supporting the traditional teacher centred methods of teaching.

Conclusions and recommendations

The results of the study show that most of the teachers rarely used the computer to enhance their classroom teaching. One major reason was that many of the teachers were not adequately trained to use the computer to teach and most of them were not very confident to utilise the technology in their teaching. They felt that they were incompetent and uncomfortable using the computer in the classroom. Generally, there was lack of confidence in handling the computer in the classroom due to insufficient knowledge of technology.

The research findings highlight lack of pedagogical skills as the central problem and dilemma that teachers face in their use of computers as teaching and learning resources. In order for teachers to use computers appropriately, they must not only consider the structure and implicit values of any computer programme, but they must also consider their role within the classroom. Thus, to be effective, a teacher requires the relevant pedagogical skills to deal with the effective implementation of computers as teaching and learning resources. Looking at the research results, it seems necessary to argue for both specific computer-skills, and pedagogical skills training for teachers as the key for the effective implementation of computers to transform the teaching and learning process in schools. In fact as Newson argues, "...we do not need to teach our students how to use these new technologies; they will learn without us, as they have learned how to ride bicycles, drive cars, and operate televisions and videocassette recorders".

Instead, teachers require computer competences that are defined within the context of pedagogical skills. In practical terms, the teachers require the following skills:

- sound pedagogical, didactical and psychological craftsmanship;
- wide knowledge of the application possibilities of computers as teaching and learning tools;
- skills to guide students in the use of the new learning tool;

This researcher contends that as far as the effective utilisation of computers as teaching and learning resources is concerned, teacher-training institutions are the major driving force. Presently, teacher training institutions in Zimbabwe are fulfilling this key-position only on a very small scale, as can be concluded from the research findings. A majority of the teachers indicated that they had not received training in the use of computers as teaching tools. It is, therefore, recommended that the teacher training institution take the leading role in preparing teachers to be able to take advantage of the strengths of computers to improve the quality of teaching and learning in schools.

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